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Toxicity of Compounds in AP-3
Production

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We have been requested to produce at Orangeburg 500 pounds of AP-3 (methyl cyclopentadienyl manganese tricarbonyl).

Briefly the process is as follows:

- (1) At 180 C, react the dimer of methyl cyclopentadiene with molten metallic sodium in a diethyl carbitol or dibutyl carbitol medium.
- (2) To the reaction mass of (1), which contains the desired intermediate, sodium methyl cyclopentadiene, add anhydrous manganese chloride at 40 C. Sodium chloride is formed as a by product.
- (3) React at 160 C and 500 pounds pressure the second intermediate, still in the reaction mass of (2), with carbon monoxide. AP-3 is produced. Some free manganese may also be produced.
- (4) Recover the AP-3 from the reaction mass by distillation from the reaction mass following a water extraction to remove sodium chloride.

It is anticipated that approximately 20 pounds of AP-3 will be produced in each batch. A total production of 160 pounds per day AP-3 is predicted.

We propose to operate a closed system, except for the manganese chloride addition step, which would require momentary opening of the reaction vessel. Neither carbon monoxide nor AP-3 would be present in this reaction vessel.

We are familiar with the hazards of handling metallic sodium. We are not familiar, however, with the hazards of handling the other compounds mentioned above.

We propose to use goggles for eye protection and rubber gloves for handling materials. This process is to be

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carried out in an unwallled outside installation, so the ventilation is believed to be adequate.

Your advice as to a definition of the hazards involved in this process, and means of controlling these hazards would be appreciated.

A summary of toxicological data for some of the compounds involved in the AP-3 process is attached for your use.

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LEL/bwm

Enclosure

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TOXICOLOGICAL DATA FOR COMPOUNDS INVOLVED

IN AP-3 PRODUCTION

A review of published data available for some of these compounds reveals the following:

Diethyl carbitol can cause opaque cornea, keratoconus and necrosis of the eye. "Toxic Eye Hazards", Publ. 494 Nat. Soc. Prevention of Blindness, Inc. Handbook of Dangerous Materials recommends goggles for liquid exposure and goggles or plastic acid hood for vapor exposure. The material is not considered to be a serious inhalation hazard according to Accident Prevention Manual for Industrial Operations.

Manganese in finely divided form can cause a fire hazard. In large concentration for extended exposure, irreversible damage occurs to central nervous system. Allowable concentration in air is 6 mg/cu. meter. Handbook of Dangerous Materials.

Carbon Monoxide is highly poisonous. Allowable concentration in air is 100 PPM. Explosive limits are 12.5 to 74% by volume in air. 6400 PPM can cause headache and dizziness in 1 to 2 minutes and unconsciousness and danger of death in 10 to 15 minutes. Abstracted from Handbook of Dangerous Materials.

AP-3 (methyl cyclopentadienyl manganese tricarbonyl) toxicity is discussed in an April 23, 1956 communication to Dr. Shapiro from Mr. Sylvan Witherup of the Kettering Laboratory. The code name at the time was APR-128.